QP-OHCI User Guide

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i. Revision History

Revision	Date	Description
v0r0	9/26/04	Initial Internal Release
v1r0	5/31/05	Final Release

ii. Reference Documents

Document #	Title	Author
IEEE-1394-1995	IEEE Std 1394-1995, IEEE Standard for a High Performance Serial Bus	IEEE
IEEE-1394a-2000	IEEE Std 1394a-2000, IEEE Standard for a High Performance Serial Bus—Amendment 1	IEEE
OHCI 1.0	1394 Open Host Controller Interface Specification Release 1.0	Promoters of 1394 Open HCI
OHCI 1.1	1394 Open Host Controller Interface Specification Release 1.1	Promoters of 1394 Open HCI

iii. Table of Contents

QP-OHCI User Guide 1
1 Introduction 4
1.1 OHCI Test Overview 4
2 Requirements and Installation 6
2.1 Hardware and Software Requirements 6
2.2 Software Installation 6
2.3 How to Contact Quantum Parametrics LLC 7
3 User Interface 8
3.1 Starting and Exiting 8
3.2 Excel and Log Files 12
3.2.1 Test Variables 13
3.3 Console Window 13
3.4 Test Select Status Window 14
3.4.1 Select All 14
3.4.2 Select None 15
3.4.3 Clear Status 15
3.4.4 Expand All/Collapse All Tests 15
3.4.5 Run Selected Tests 16
3.4.6 Skip Test 16
3.4.7 Stop Tests 16
3.5 Control Window 16
3.5.1 Find Nodes 16
3.5.2 Initialize HW 17
3.5.3 Close Log 17

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3.5.4 Load All Menus/View Test Groups 17
4 Log File Format 19
4.1 Example Log File 19

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1 Introduction

Quantum Parametrics' OHCI Test Application (QP-OHCI) implements the 1394 OHCI Test Specification. Developed by Quantum Parametrics QP-OHCI provides an in-depth low-level verification of IEEE-1394 Open HCI link layer controllers with PCI host bus interface.

QP-OHCI test corresponds directly to the 1394 OHCI Test Specification. This document makes no attempt to replicate the 1394 OHCI Test Specification. The 1394 OHCI Test Specification should be consulted to better understand each test. To make this easy QP-OHCI test IDs directly correspond to the test IDs found in the 1394 OHCI Test Specification.

QP-OHCI provides low-level tests for all aspects of 1394 OHCI. From register tests through stressful testing of all DMA engines, QP-OHCI is an excellent tool for OHCI silicon makers and system integrators.

QP-OHCI is built on Quantum Parametrics' (QP) proven QP-NT technology. Utilizing the OHCI specific channel (plugin) the test creates all the test scenarios specified by the OHCI Test Specification (except for those designated as Bench Test).

1.1 OHCI Test Overview

To successfully execute the OHCI test, two devices running QP-OHCI are required. The Device Under Test (DUT) is the node initiating the test (tests have been selected in the Test Select Menu and the 'Run Selected Tests' button has been pressed). The Tester Device (TD) is the other device with QP-OHCI loaded, the GO button has been pressed but no test is explicitly initiated by the user. Often a 1394 bus analyzer is needed to help diagnose issues found during the test. A typical test configuration is shown below.

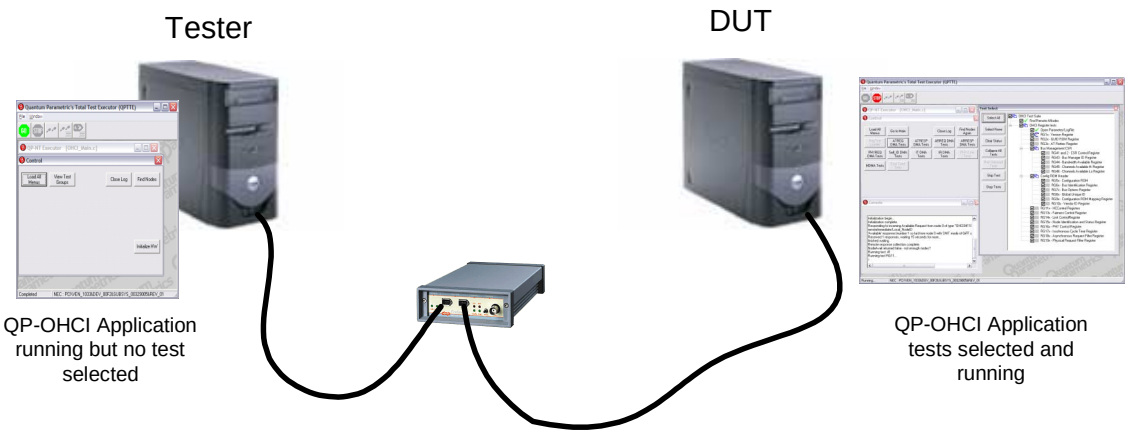

Figure 1: Typical Test Topology.

The QP-OHCI test automatically determines the DUT and Tester through a discovery process. The discovery process is automatically executed when either the **Find Remote ANodes** Test Select menu item is selected or the **Find Nodes** button is selected. If more than one QP-OHCI Tester device is present, the first one found is automatically selected and used for testing. Before a test is started the "OHCI Integrated result.xls" spreadsheet should be updated with DUT specific information. The changes should only be made to the Test Variables sheet.

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In general each OHCI test is autonomous. Each test starts with the OHCI hardware and driver in a known state, test conditions are added, and then the test is run. At the end of each test OHCI hardware and driver are put back to a known state.

Because of the complexity and low level nature of the OHCI test a particular test may have a hard failure before a test completes and the clean-up process takes place. In this case the **Initialize HW** button (found on the Main Menu in the Control window) may be used to issue a soft reset to the OHCI hardware and reinitialize the driver. A 1394 bus reset is then issued as the soft reset clears the Node IDs register therefore a new set of self-ids is required.

The **Load All Menus** button loads all available tests to the **Test Select Menu**. It should be noted that there are hundreds of tests therefore QP created a test groups options which allows specific tests to be load. This is done through the **View Test Groups** button. The View Test Groups button causes additional buttons to appear in the Control window. These buttons represent groups of tests. Selecting the Register Test and Self_ID DMA Tests buttons will cause these test to load to the Test Select Menu. All other enabled buttons cause a further break down of the test group.

When leaving the OHCI test prematurely the **Close Log** button should be used to flush any cached log data that hasn't been written to the log file yet.

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2 Requirements and Installation

Quantum Parametrics' OHCI Test Application (QP-OHCI) implements the OHCI Test Specification.

2.1 Hardware and Software Requirements

QP-OHCI executes on the IBM PC compatible family of computers with a 500MHz Pentium III class processor or greater. Currently QP-1394TSA requires the use of Windows XP. QP-NT also requires the use of Microsoft Excel to generate a report form.

2.2 Software Installation

1. This installation requires any version of Win-XP to be installed on the target PC.

2. If previous version of "OHCI Test Application" is present on the target system first perform an un-install of the "OHCI Test Application" using the Win-XP "Add or Remove Programs" application from the Control Panel. See note in below*.
   - To enter Control Panel select start | Control Panel | Add or Remove Programs. If the start menu is in the classic setting then select start | settings | Control Panel | Add or Remove Programs.

3. Don't plug in the provided USB key until asked to do so

4. Insert the "OHCI Test Application" CD. If the target computer is configured for Autorun from CD media the setup and installation will begin automatically

4.1 If autorun is not enabled
   - If autorun is not enabled on your computer you can start setup by going to Windows Explorer and right clicking on the installation CD drive icon and selecting 'autoplay' from the drop down menu. This will automatically run the installation.

5. Follow all prompts

5.1 If multiple OHCI devices are detected, the QPInstaller will prompt for a device selection after the "OHCI Test Application" installation completes. Select the OHCI device that you want to install the driver for and click 'OK'.

6. Enter key and product authorization codes as explained below.

***Note:**
If the "OHCI Test Application" is earlier than v1.0.0.0 you will be requested to restart your computer at the end of the application and driver installation process. You do not need to take the CD out of the computer before restarting.
   - Once the computer is restarted you will need to start the QPInstaller.exe utility manually. This is done by going to Windows Explorer and selecting the installation CD drive icon and double clicking the file 'QPInstaller'.
   - Select the "Install QPTnt Driver" operation option. If multiple devices are present select the device that you want to install drivers for. Click the "OK" button to begin the driver installation.

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2.3 How to Contact Quantum Parametrics LLC

Quantum Parametrics LLC may be contacted by phone at:

(719)592-1394 (USA) or by email at:

info@quantumparametrics.com or visit our web site at:
www.quantumparametrics.com

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3 User Interface

QP-OHCI consists of five primary windows: Quantum Parametrics' Total Test Executor environment, QP-NT Executor, Test Select, Control, and Console. The Quantum Parametrics' Total Test Executor environment window is the home (main window) for QP-OHCI. The QP-NT Executor window executes the commands given to it by the test scripts. To run QP-OHCI the QP-NT Executor window must remain open during any script code execution. The Test Select and Console windows reside in the Total Test Executor environment window and comprise the OHCI Test Suite Application interface to the user. Buttons in the Control panel are programmed to specific functions relating to the control of the OHCI tests.

QP-OHCI requires Microsoft Excel to log test results in the OHCI Integrated results form. QP-OHCI also generates a log file containing detailed accounts of the test.

3.1 Starting and Exiting

*** Important Note ***

Before starting QP-OHCI make sure all 1394 devices are disconnected from the Tester computer. If devices are connected, please disconnect them, quit QP-OHCI and restart QP-OHCI.

Initial startup of QP-OHCI:

1. Using the Start | All Programs menu, select the "OHCI Test" executable from the "Quantum Parametrics" group.
   - The application will ask you to insert the USB key
   - When the USB key is plugged in for the first time a "Found New Hardware" dialog box will appear. This will install the software for the Crypto USB key device.
   - Next, it will prompt you for the Key code and authorization codes with the following screen.

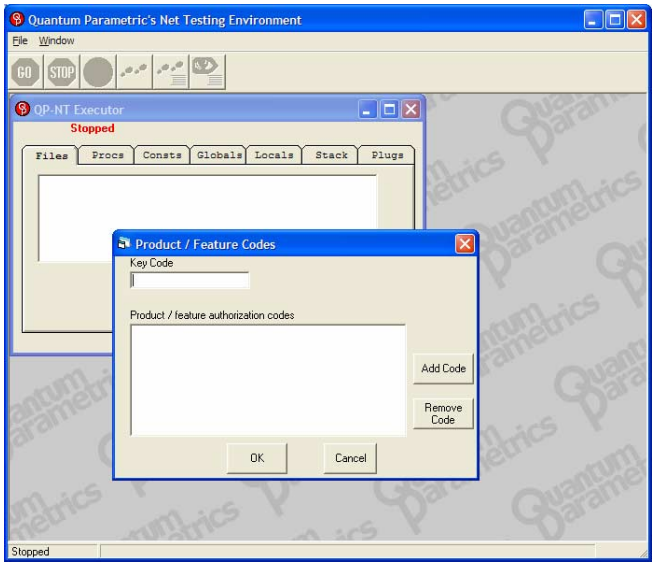

Figure 2: Product/Feature Codes entire.

- Enter the 8 digit code that is on the USB key in the Key Code box as shown below.

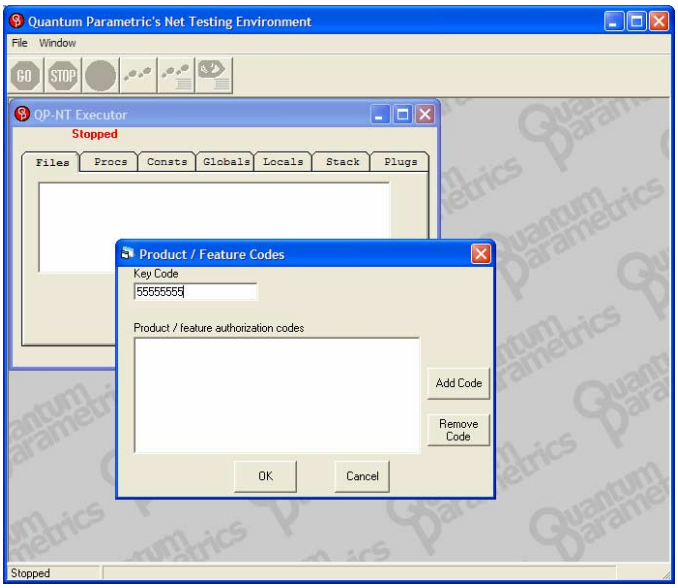

Figure 3: Key Code entry, code is found on USB key.

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- Next, click the Add Code button and enter the first Product Authorization code (from the included code sheet that came with the key)

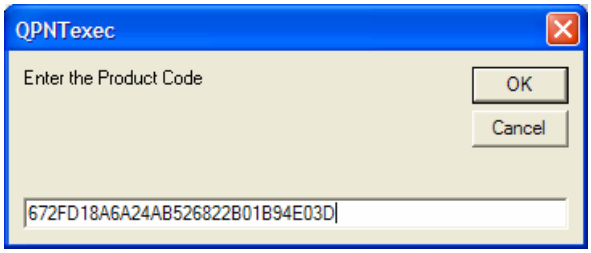

Figure 4: Product Code Authorization entry.

- Use the Add Code button for each additional product code.

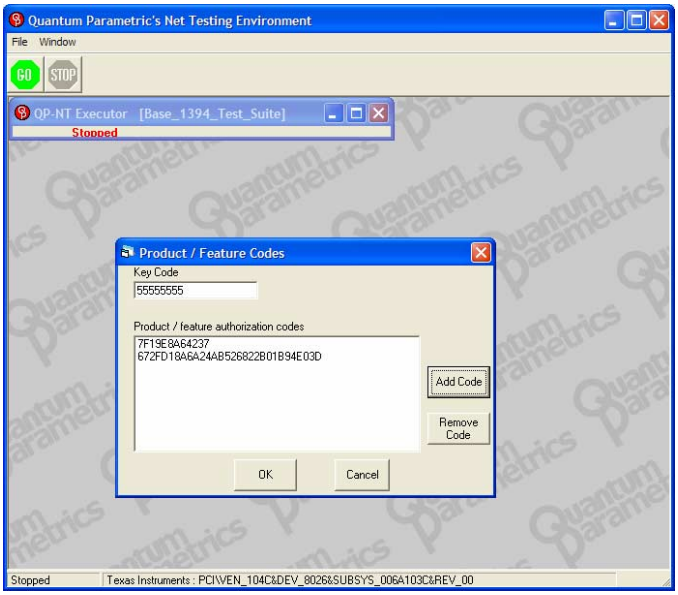

Figure 5: Authorization Code listing.

- If you make a mistake, just select the incorrectly entered code, then click Remove Code, and try again.
- After the key code and all product authorization codes are entered, click OK.
- Next, you should see the following message pop up, click OK

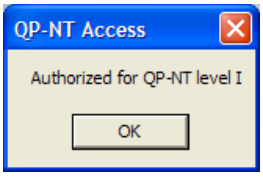

Figure 6: Correct installation indication.

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- The first run of the application will install the QPTntVdrv virtual device driver. You will be prompted through this operation with the “Found New Hardware Wizard”. This installation will only occur on the initial run of the “OHCI Test Application.”
- Next you should see the screen in Figure 6
- It is recommended that you now exit the application and continue at step 2, below

To start QP-OHCI:

2. Using the Start | All Programs menu, select the “OHCI Test Application” executable from the “Quantum Parametrics” group.
   - A test project initialization occurs during the application start-up and a progress bar indicates the initialization status during the start-up phase.
   - The Executor window should appear (see Figure 7) once the initialization is complete.

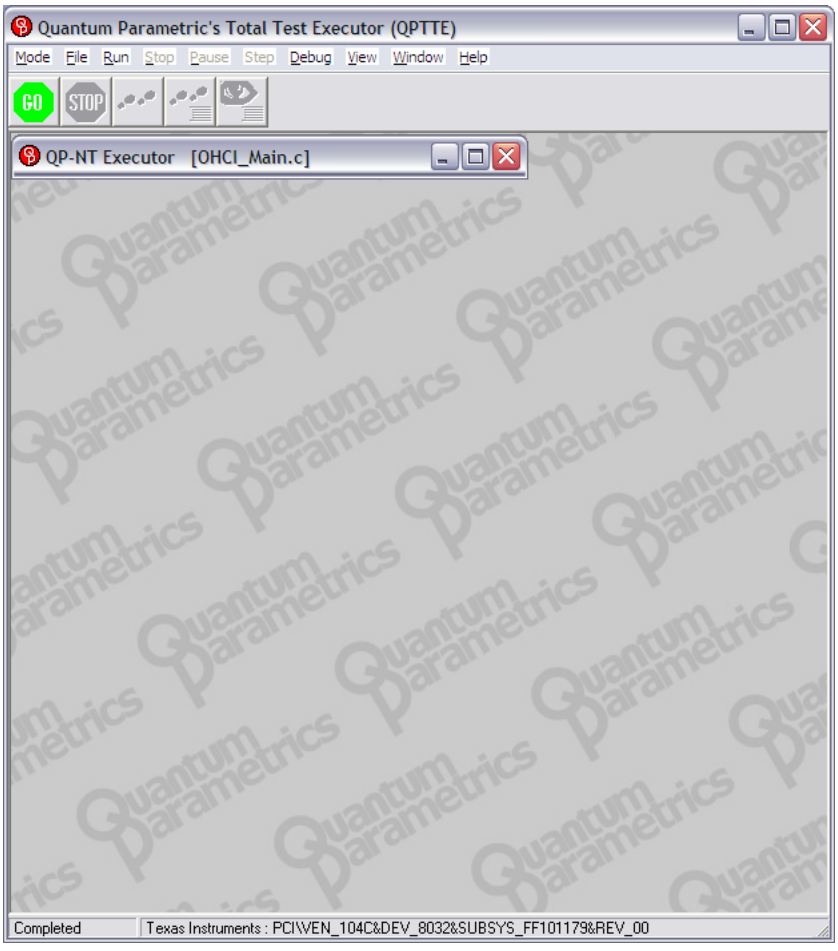

Figure 7: Initial QP-OHCI Window.

3. To begin using the test suite, wait for the initialization to complete, then select the green **GO** icon on the toolbar or **Run** from the menu.
4. Once the Control Panel window appears, test initialization and selection can begin. To load all tests into the Test Select window click the **Load All Menus** button. **Note:** The OHCI Test consists of hundreds of tests. For first time tests QP recommends using the **View Test Groups** button to enable loading of specific tests.

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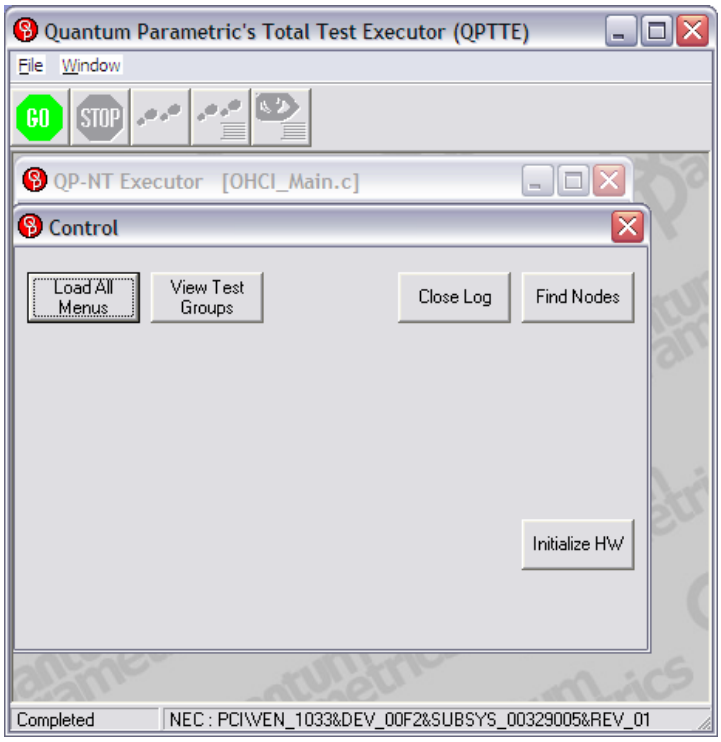

Figure 8: Control Panel.

5. Please see the Product Description chapter for detail about QP-OHCI operation.
6. To exit select the **X** box in the upper right-hand corner of the Quantum Parametrics's Total Test Executor environment window. Also, when the Test Select or Console windows are active, the **File** menu **Exit** maybe selected.

3.2 Excel and Log Files

QP-OHCI requires Microsoft Excel to log test results in the 'OHCI Integrated results' form. QP-OHCI also generates a plain-text log file containing detailed accounts of the test run. When QP-OHCI is installed two sub-directories of the Total Test Executor directory are created: Template and Test Results.

Example Directory Structure:
C:\Program Files\Quantum Parametrics\QP Total Test Executor App\Template
C:\Program Files\Quantum Parametrics\QP Total Test Executor App\Test Results

The Template directory contains the 'OHCI Integrated results' form which should not be edited. When a test is executed QP-OHCI copies the form from the Templates directory to the Test Results directory. QP-OHCI uses the date and time to customize the file name for each test run. The new file name is generated as follows:

```
…\Test Results\ OHCI_<date in m-d-yyyy format>_<time in hh-mm-ss-AM/PM format>.xls
```

Similarly QP-OHCI also generates an empty log file and places it in the Test Results directory as well. The date and time are also used to make the log file name unique. For more details regarding the log file please see Chapter 4.

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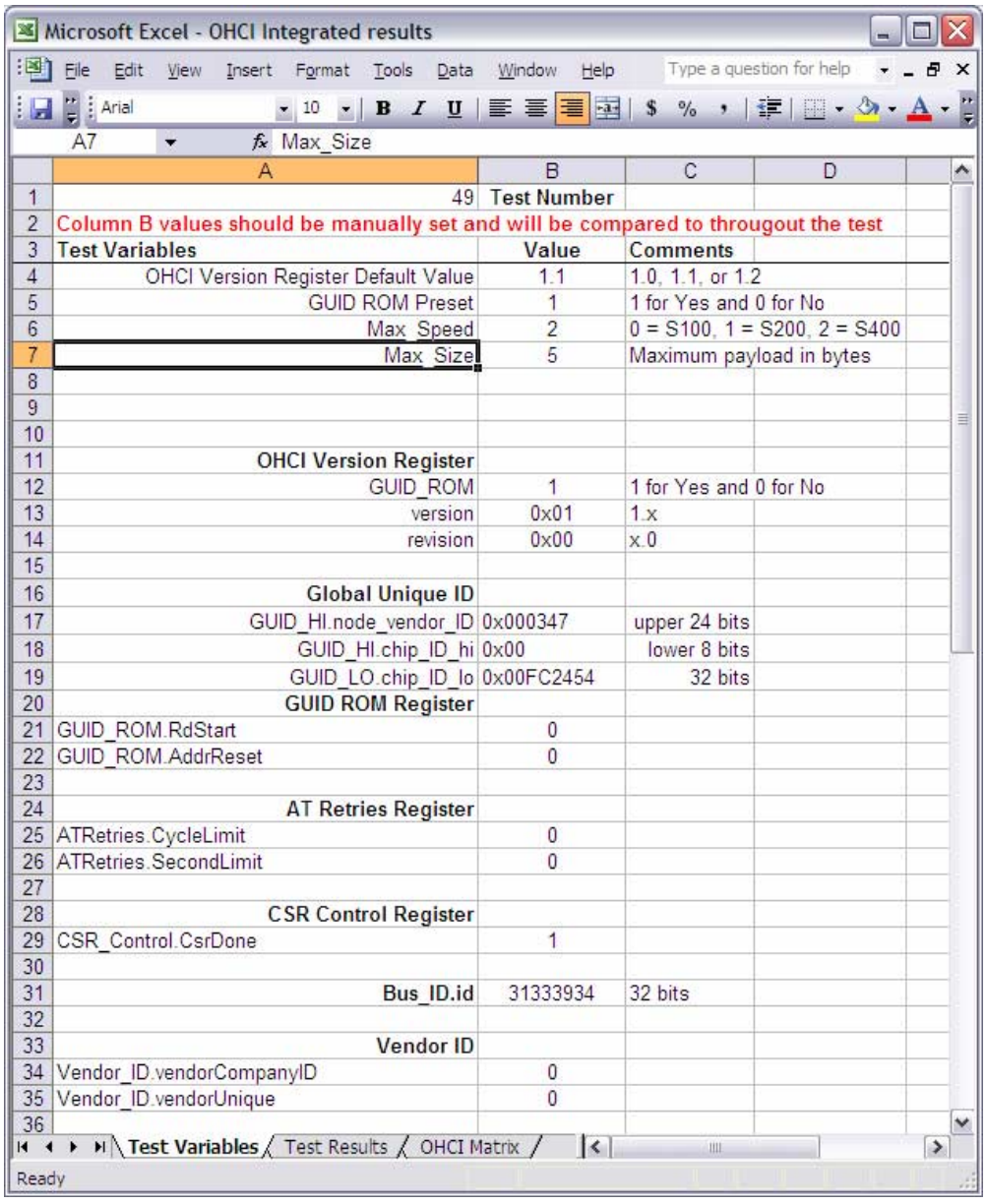
3.2.1 Test Variables

The Excel report form also contains important test variables that must me configured before the test begins. Failure to do so may cause some tests to inappropriately fail.



Microsoft Excel - OHCI Integrated results

File Edit View Insert Format Tools Data Window Help — Type a question for help

Arial 10 B I U $ % ,

A7 fx Max_Size

	A	B	C	D
1	49	Test Number		
2	Column B values should be manually set and will be compared to througout the test			
3	Test Variables	Value	Comments	
4	OHCI Version Register Default Value	1.1	1.0, 1.1, or 1.2	
5	GUID ROM Preset	1	1 for Yes and 0 for No	
6	Max_Speed	2	0 = S100, 1 = S200, 2 = S400	
7	Max_Size	5	Maximum payload in bytes	
8				
9				
10				
11	OHCI Version Register			
12	GUID_ROM	1	1 for Yes and 0 for No	
13	version	0x01	1.x	
14	revision	0x00	x.0	
15				
16	Global Unique ID			
17	GUID_Hi.node_vendor_ID	0x000347	upper 24 bits	
18	GUID_Hi.chip_ID_hi	0x00	lower 8 bits	
19	GUID_LO.chip_ID_lo	0x00FC2454	32 bits	
20	GUID ROM Register			
21	GUID_ROM.RdStart	0		
22	GUID_ROM.AddrReset	0		
23				
24	AT Retries Register			
25	ATRetries.CycleLimit	0		
26	ATRetries.SecondLimit	0		
27				
28	CSR Control Register			
29	CSR_Control.CsrDone	1		
30				
31	Bus_ID.id	31333934	32 bits	
32				
33	Vendor ID			
34	Vendor_ID.vendorCompanyID	0		
35	Vendor_ID.vendorUnique	0		
36				

Test Variables / Test Results / OHCI Matrix

Ready

Figure 9: Test Variables sheet in Excel.

3.3 Console Window

The Console Window informs the user of the details of the test. The same information is also placed into the log file. During the course of a test the operator may be asked to reference information found in the Console Window. Figure 10 shows an example Console and Test Select Status Window.

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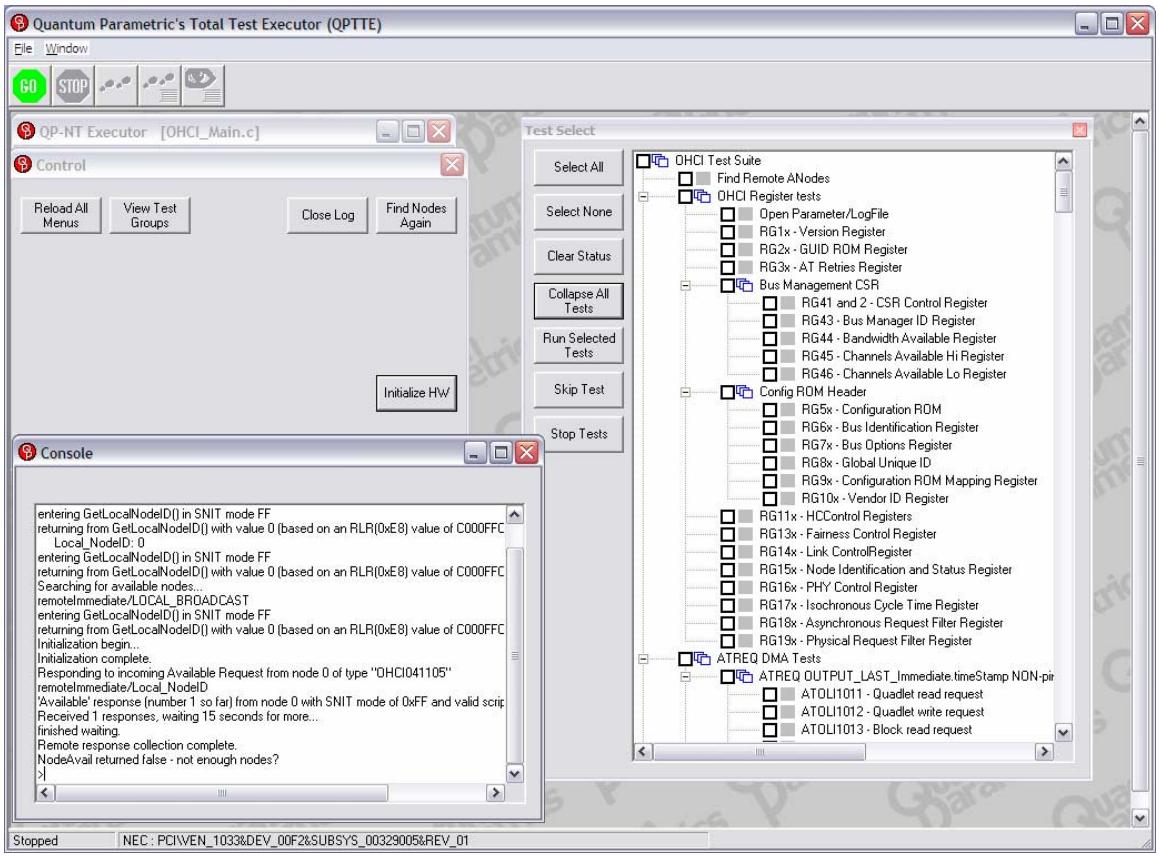
Quantum Parametric's Total Test Executor (QPTTE)
File Window
GO
STOP
QP-NT Executor [OHCI_Main.c]
Control
Reload All Menus
View Test Groups
Close Log
Find Nodes Again
Initialize HW
Console
entering GetLocalNodeID() in SNIT mode FF
returning from GetLocalNodeID() with value 0 (based on an RLR(0xE8) value of C000FFC
Local_NodeID: 0
entering GetLocalNodeID() in SNIT mode FF
returning from GetLocalNodeID() with value 0 (based on an RLR(0xE8) value of C000FFC
Searching for available nodes...
remoteImmediate/LOCAL_BROADCAST
entering GetLocalNodeID() in SNIT mode FF
returning from GetLocalNodeID() with value 0 (based on an RLR(0xE8) value of C000FFC
Initialization begin...
Initialization complete.
Responding to incoming Available Request from node 0 of type "OHCI041105"
remoteImmediate/Local_NodeID
'Available' response (number 1 so far) from node 0 with SNIT mode of 0xFF and valid scrip
Received 1 responses, waiting 15 seconds for more...
finished waiting.
Remote response collection complete.
NodeAvail returned false - not enough nodes?
Test Select
Select All
Select None
Clear Status
Collapse All Tests
Run Selected Tests
Skip Test
Stop Tests
OHCI Test Suite
Find Remote ANodes
OHCI Register tests
Open Parameter/LogFile
RG1x - Version Register
RG2x - GUID ROM Register
RG3x - AT Retries Register
Bus Management CSR
RG41 and 2 - CSR Control Register
RG43 - Bus Manager ID Register
RG44 - Bandwidth Available Register
RG45 - Channels Available Hi Register
RG46 - Channels Available Lo Register
Config ROM Header
RG5x - Configuration ROM
RG6x - Bus Identification Register
RG7x - Bus Options Register
RG8x - Global Unique ID
RG9x - Configuration ROM Mapping Register
RG10x - Vendor ID Register
RG11x - HCControl Registers
RG13x - Fairness Control Register
RG14x - Link ControlRegister
RG15x - Node Identification and Status Register
RG16x - PHY Control Register
RG17x - Isochronous Cycle Time Register
RG18x - Asynchronous Request Filter Register
RG19x - Physical Request Filter Register
ATREQ DMA Tests
ATREQ OUTPUT_LAST_Immediate.timeStamp NON-pir
ATOLI1011 - Quadlet read request
ATOLI1012 - Quadlet write request
ATOLI1013 - Block read request
Stopped
NEC : PCI\VEN_1033&DEV_00F2&SUBSYS_00329005&REV_01

Figure 10: Example Console and Test Select Windows.

3.4 Test Select Status Window

The Test Select Status Window shows the progress and high-level status as the test sequence progresses. Icon boxes to the left of each item provide the following status indications:

‘?’ Test verdict is unknown or not applicable
‘√’ Test verdict is Pass
‘X’ Test verdict is Fail
‘T’ Testing in progress

Name/high-level description of the tests appear as nodes in the tree. Checkboxes to the left of each item allow for enabling/disabling tests individually and as groups. Note that the program may initialize the tree in a collapsed mode – simply double-click the root node to expand the tree. Double-clicking a leaf node will run that test immediately.

Before executing most OHCI tests it is recommended that an associated Tester Device (TD) is found. The QP-OHCI test automatically determines the DUT and TD through a discovery process. The discovery process is automatically executed when either the **Find Remote ANodes** Test Select menu item is selected or the **Find Nodes** button is selected. If more than one TD is present the first one found is automatically selected and used for testing.

3.4.1 Select All

The **Select All** button selects all of the tests found in the current test menu. After the selection is made the **Run Selected Tests** button is used to execute the selected tests.

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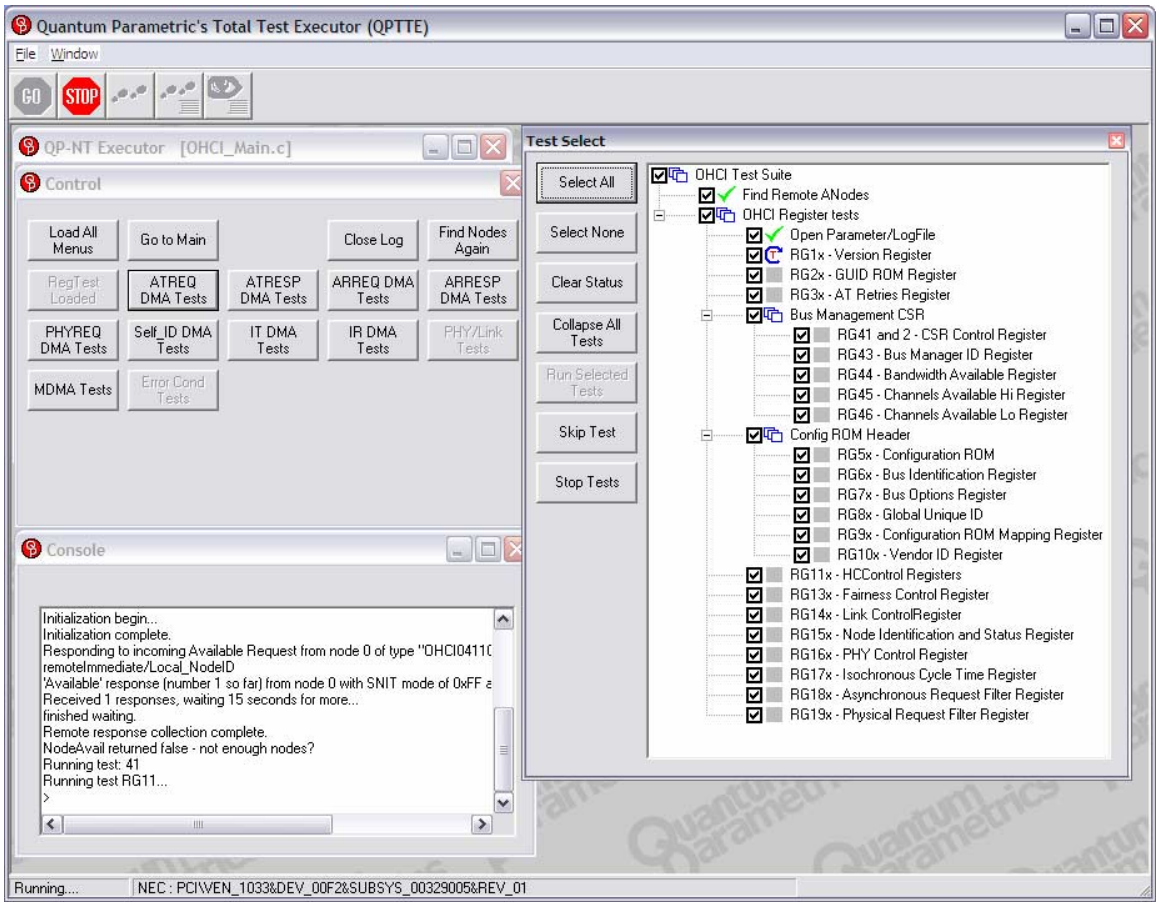

Figure 11: Example Test Select tree.

3.4.2 Select None

The Select None button is used to deselect any test that has been previously selected.

3.4.3 Clear Status

The Clear Status button is used to clear the status indications from previously executed tests.

3.4.4 Expand All/Collapse All Tests

The Expand All button cause the test menu to expand and show all leafs. Once done the button is renamed Collapse All. The Collapse All Tests button causes the test menu to compress so only the highest test group is shown. Once done the button is renamed Expand All.

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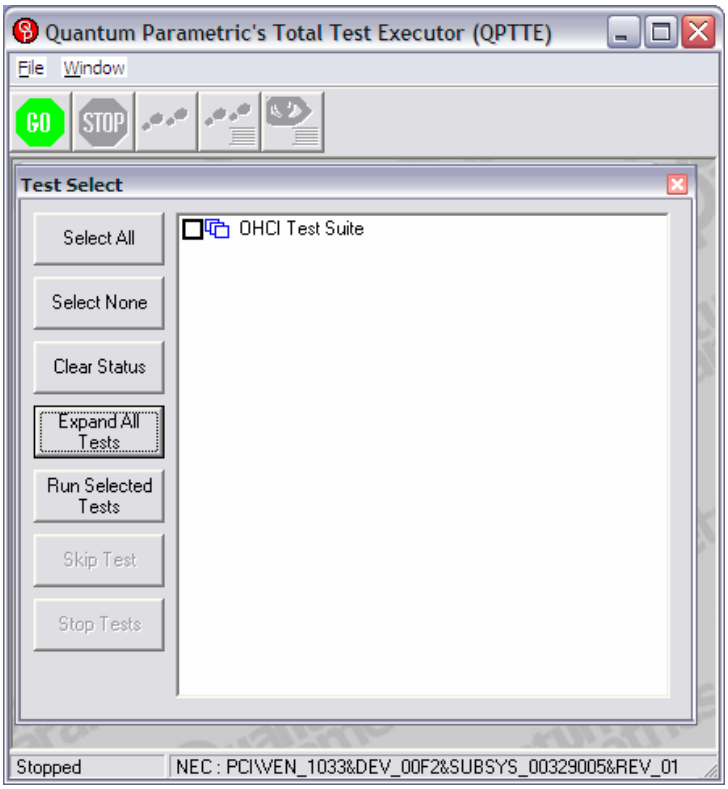

Figure 12: Initial collapsed state –click label to expand

3.4.5 Run Selected Tests

The Run Selected Tests button starts the execution of any tests selected in the Test Select Menu.

3.4.6 Skip Test

The Skip Test button is used to skip (not execute) the next test.

3.4.7 Stop Tests

The Stop Tests button stops the execution of all tests.

3.5 Control Window

The Control window is central to the execution of all tests. From the Control window the user can load tests to the Test Select Menu window. The user can also close the log file, find the test node, and initialize hardware.

3.5.1 Find Nodes

The QP-OHCI test automatically determines the DUT and Tester through a discovery process. The discovery process is automatically executed when either the **Find Remote ANodes** Test Select menu item is selected or the **Find Nodes** button is selected. If more than one QP-OHCI Tester device is present the first one found is automatically selected and used for testing. Before a test is

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started the "OHCI Integrated result.xls" spreadsheet should be updated with DUT specific information. Changes should only be made to the Test Variables sheet.

3.5.2 Initialize HW

In general each OHCI test is autonomous. Each test starts with the OHCI hardware and driver in a known state, test conditions are added, and then the test is run. At the end of each test OHCI hardware and driver are put back to a known state.

Because of the complexity and low level nature of the OHCI test a particular test may have a hard failure before a test completes and the clean-up process takes place. In this case the **Initialize HW** button (found at the Main Menu in the Control window) may be used to issue a soft reset to the OHCI hardware and reinitialize the driver. A 1394 bus reset is then issued as the soft reset clears the Node IDs register therefore a new set of self-ids is required.

3.5.3 Close Log

When leaving the OHCI test prematurely the **Close Log** button should be used to flush any cached log data that hasn't been written to the log file yet.

3.5.4 Load All Menus/View Test Groups

The **Load All Menus** button loads all available tests to the **Test Select Menu**. It should be noted that there are hundreds of tests therefore QP created a test groups options which allows specific tests to be load. This is done through the **View Test Groups** button. The View Test Groups button causes additional buttons to appear in the Control window. These buttons represent groups of tests (each group represents a chapter from the 1394 OHCI Test Specification).

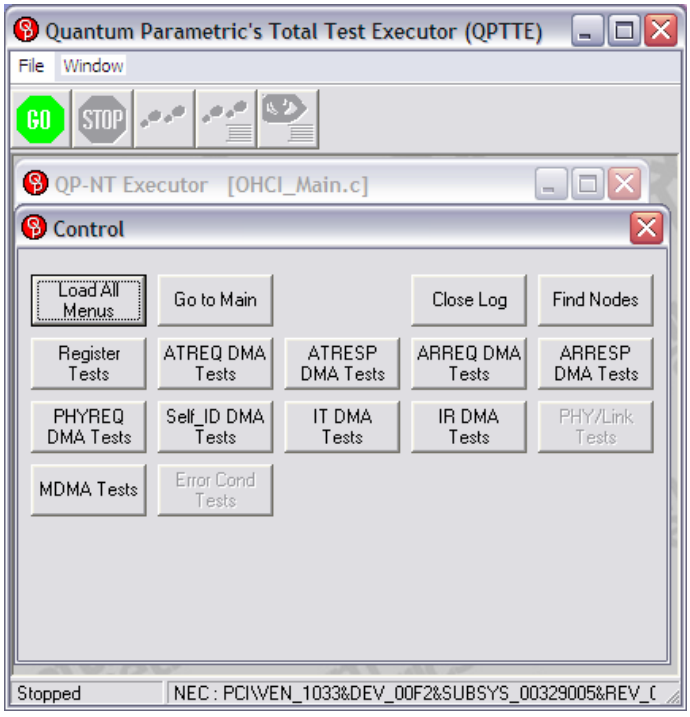

Figure 13: Highest level group of tests.

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Selecting the Register Test and Self_ID DMA Tests buttons will cause these test to load to the Test Select Menu. All other enabled buttons cause a further break down of the test group. The picture below shows the breakdown of the Asynchronous Transmit Request DMA tests.

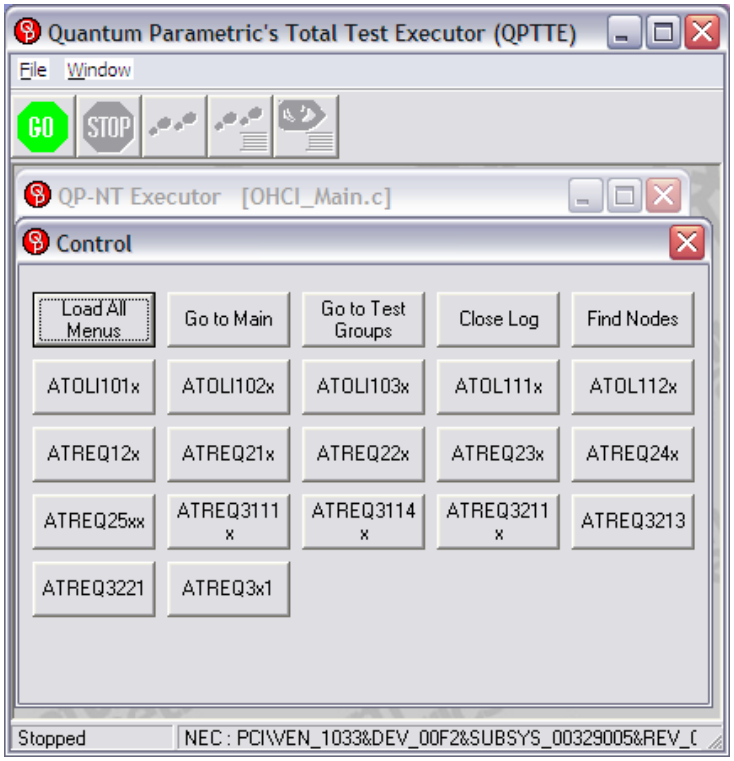

Figure 14: Asynchronous Transmit Request DMA test groups.

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4 Log File Format

QP-OHCI creates a log file. The log file provides details about the test. These details consist of message about the test plus QP specific channel (API) information. For more information about the QP specific channels please consult the QP-Network Test Environment User Manual.

The example below shows the start of the RG11 test. Some lines in the log provide information about the test, such as, Running test RG11… or Initiate Soft Reset. Lines beginning with `<name>:` are channel specific. In the example below the STP:, TNT:, and OHCI: channels are shown. STP stands for Simple or Silicon Test Protocol channel, TNT stands for Thirteen Ninety-four Test channel, and OHCI stands for Open Host Controller Interface channel.

4.1 Example Log File

Example: STP command to write link register 0x50 with 0x00010000.

```
STP:          2:09:59 PM    5/17/2005     wlr(0x00000050, 0x00010000)
```

Example: TNT command to get result item 1. It returned 0x00C00000

```
TNT:          2:10:00 PM    5/17/2005     cmdresultitem(0x00000001)
TNT:          2:10:00 PM    5/17/2005        ---> 0x00C00000
```

Example: OHCI command to initiate a soft reset of the OHCI controller, reload the OHCI driver. It returned a 0x1.

```
OHCI:         2:10:38 PM    5/17/2005     initializehw()
OHCI:         2:10:38 PM    5/17/2005        ---> 0x1

--------------------------------------------------------------------------
QP-NT Log file: Test Results\OHCI_5-17-2005_2-09-39-PM.txt
Source Script file: C:\Quantum Parametrics\Products\OHCI Test\OHCI
Current\OHCI Proj Rel Candidate 1\OHCI Project Rel 1.0\code\OHCI_Main.c

 OHCI Test Script 1.0.0, 5/6/05 - Based on OHCI Test Specification
Draft 0.9.73
Running test: 41
STP:          2:09:47 PM    5/17/2005     snit(0x00000003)
Running test RG11...
      Initiate Soft Reset
STP:          2:09:59 PM    5/17/2005     wlr(0x00000050, 0x00010000)
STP:          2:10:00 PM    5/17/2005     rlr(0x00000050)
TNT:          2:10:00 PM    5/17/2005     cmdresult()
TNT:          2:10:00 PM    5/17/2005        ---> 0x00000002
TNT:          2:10:00 PM    5/17/2005     cmdresultitem(0x00000001)
TNT:          2:10:00 PM    5/17/2005        ---> 0x00C00000
STP:          2:10:01 PM    5/17/2005     rlr(0x00000000)
```

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```
TNT:          2:10:01 PM    5/17/2005     cmdresult()
TNT:          2:10:01 PM    5/17/2005        ---> 0x00000002
TNT:          2:10:02 PM    5/17/2005     cmdresultitem(0x00000001)
TNT:          2:10:02 PM    5/17/2005        ---> 0x00010010
OHCI:         2:10:02 PM    5/17/2005     initializehw()
OHCI:         2:10:03 PM    5/17/2005        ---> 0x1
   Version_Register Value after SoftReset test: FAILED
Running test RG12...
STP:          2:10:18 PM    5/17/2005     rlr(0x00000000)
TNT:          2:10:19 PM    5/17/2005     cmdresult()
TNT:          2:10:19 PM    5/17/2005        ---> 0x00000002
TNT:          2:10:19 PM    5/17/2005     cmdresultitem(0x00000001)
TNT:          2:10:19 PM    5/17/2005        ---> 0x00010010
   Read: 00010010
   Wrote: 01FE00EF
STP:          2:10:22 PM    5/17/2005     wlr(0x00000000, 0x01FE00EF)
STP:          2:10:22 PM    5/17/2005     rlr(0x00000000)
TNT:          2:10:22 PM    5/17/2005     cmdresult()
TNT:          2:10:22 PM    5/17/2005        ---> 0x00000002
TNT:          2:10:23 PM    5/17/2005     cmdresultitem(0x00000001)
TNT:          2:10:23 PM    5/17/2005        ---> 0x00010010
   Read: 00010010
   Version_Register ReadOnly Fields test: PASSED
OHCI:         2:10:38 PM    5/17/2005     initializehw()
OHCI:         2:10:38 PM    5/17/2005        ---> 0x1
TNT:          2:10:38 PM    5/17/2005     InitiateBusReset()
TNT:          2:10:38 PM    5/17/2005        ---> 0x0
TNT:          2:10:39 PM    5/17/2005     getbusgeneration()
TNT:          2:10:39 PM    5/17/2005        ---> 0x00000001
TNT:          2:10:40 PM    5/17/2005     getsnitmode()
TNT:          2:10:40 PM    5/17/2005        ---> 0x00000003
```

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